

What is claimed is:

1. A recombinant DNA construct comprising a sequence encoding at least a portion of a plant desaturase, said desaturase when mature having activity toward a saturated fatty acid substrate.
2. The construct of Claim 1 encoding a biologically active plant desaturase.
3. The construct of Claim 1 wherein said sequence encodes a precursor desaturase.
- 10 4. The construct of Claim 1 wherein said sequence encodes a mature desaturase.
5. The construct of Claim 1 wherein said sequence encodes a transit peptide.
- 15 6. The construct of Claim 1 comprising a cDNA sequence.
7. The construct of Claim 1 wherein said sequence is joined to a second nucleic acid sequence which is not naturally joined to said first sequence.
- 20 8. The construct of Claim 1 comprising, in the 5' to 3' direction of transcription, a transcriptional regulatory region functional in a host cell and said sequence.
- 25 9. The construct of Claim 8 further comprising, a translational regulatory region immediately 5' to said sequence and a transcriptional/translational termination regulatory region 3' to said sequence, wherein said regulatory regions are functional in said host cell.
10. The construct of Claim 8 wherein said sequence is a sense sequence.

11. The construct of Claim 8 wherein said sequence is an anti-sense sequence.

12. The construct of Claim 8 wherein said host cell is a plant cell.

5 13. The construct of Claim 12 wherein said transcriptional initiation region is obtained from a gene preferentially expressed in plant seed tissue during lipid accumulation.

10 14. The construct of Claim 13 wherein said transcriptional initiation region is selected from the regulatory region 5' upstream to a structural gene of the group consisting of any one of Bce4, seed ACP Bcg 4-4 and napin 1-2.

15 15. The construct of Claim 9 wherein said transcriptional termination region is a plant desaturase termination region.

16. The construct of Claim 1 wherein said plant desaturase is a  $\Delta$ -9 desaturase.

20 17. The construct of Claim 1 wherein said sequence is obtainable from any one of safflower, rapeseed, jojoba and castor.

25 18. A method of modifying the fatty acid composition of a plant host cell from a given percentage (by weight) of saturated fatty acids to a different percentage (by weight) of saturated fatty acids comprising

30 growing a host plant cell having a recombinant DNA construct integrated into the genome of said cell or a parent cell thereof, said construct encoding a fatty acid modifying portion of a plant desaturase under the control of regulatory elements functional in said plant cell during lipid

*Sub E3*  
accumulation under conditions which will promote the activity of said regulatory elements.

19. The method of Claim 18 further comprising the expression of said plant desaturase.

5 20. The method of Claim 18 further comprising the inhibition of endogenous plant desaturase.

*Sub E3*  
21. The method of Claim 18 wherein said regulatory elements function preferentially in plant seed. *Cells*

10 22. The method of Claim 18 wherein said saturated fatty acids are triglyceride acyl fatty acid groups.

23. The method of Claim 18 wherein the percentage of stearate is modified.

24. The method of Claim 23 wherein the percentage of saturates is increased.

15 25. The method of Claim 23 wherein the percentage of saturates is decreased.

*Sub E3*  
20 26. The method of ~~any one of claims 18-25~~ wherein said plant host cell is selected from the group consisting of rapeseed, sunflower, castor, cotton, Cuphea, peanut, soybean, oil palm and corn.

*Sub E3*  
27. A plant cell having a modified percentage (by weight) of saturated fatty acids produced according to ~~any one of Claims 18-25~~.

25 28. A plant cell selected from the group consisting of rapeseed, sunflower, castor, cotton, Cuphea, peanut, soybean, oil palm and corn, having a modified percentage (by weight) of saturated fatty acids produced according to any one of Claims 18-25.

29. A plant seed having a modified percentage (by weight) of saturated fatty acids as compared to a seed of said plant having a native percentage (by weight) of saturated fatty acids produced according to a method comprising

5 growing a plant to seed, comprising in the genome of embryo cells a recombinant DNA construct encoding a fatty acid modifying portion of a plant desaturase under the control of regulatory elements functional in seed during 10 lipid accumulation, to produce seed under conditions which will promote the activity of said regulatory elements, and harvesting said seed.

15 30. The seed of Claim 29 wherein said plant is selected from the group consisting of rapeseed, sunflower, castor, cotton, cuphea, peanut, soybean, oil palm and corn.

31. The seed of Claim 29 wherein said seed is an oilseed.

32. The seed of Claim 29 wherein said plant desaturase is a  $\Delta$ -9 desaturase.

20 33. A method of modifying the fatty acid composition of oil triglycerides in an oil producing plant host cell from a given percentage (by weight) of saturated fatty acids to a different percentage (by weight) of saturated fatty acids comprising

25 growing a host plant cell having a recombinant DNA construct integrated into the genome of said cell or a parent cell thereof, said construct encoding a fatty acid modifying portion of a plant desaturase under the control of regulatory elements functional in said plant cell during lipid 30 accumulation under conditions which will promote the activity of said regulatory elements.

34. The method of ~~Claim 33~~ further comprising the expression of said plant desaturase.

35. The method of ~~Claim 33~~ further comprising the inhibition of endogenous plant desaturase.

36. The method of ~~Claim 33~~ wherein ~~said regulatory elements~~ function preferentially in plant seed <sup>cells</sup>.

37. The method of ~~Claim 33~~ wherein said saturated fatty acids are triglyceride acyl fatty acid groups.

38. The method of ~~Claim 33~~ wherein the percentage of stearate is modified.

39. The method of ~~Claim 38~~ wherein the percentage of saturates is increased.

40. The method of ~~Claim 38~~ wherein the percentage of saturates is decreased.

41. The method of ~~any one of Claims 33-40~~ wherein said plant host cell is selected from the group consisting of rapeseed, sunflower, castor, cotton, Cuphea, peanut, soybean, oil palm and corn.

42. A plant seed oil of a plant having an endogenous level of saturated fatty acids comprising a plant seed oil having a modified level of saturated fatty acids.

43. The oil of ~~Claim 42~~ wherein said plant is rapeseed.

44. A plant seed oil separated from an seed produced according to ~~any one of Claims 29-32~~.

45. A triglyceride oil from a plant selected from the group consisting of rapeseed, sunflower, castor, cotton, Cuphea, peanut, soybean, oil palm, and corn, wherein the fatty acid composition of the oil has been modified from a

given percentage (by weight) of saturated fatty acids to a different percentage (by weight) of saturated fatty acids by a method comprising:

growing a host plant cell having integrated into the genome of said cell or a parent cell thereof, a recombinant DNA sequence encoding a plant desaturase under control of regulatory elements functional in said plant cell during lipid accumulation under conditions which will promote the activity of said regulatory elements.

10 46. The oil of Claim 45 wherein said method further comprises the expression of said plant desaturase.

47. The oil of Claim 45 wherein said method further comprises the inhibitor of endogenous plant desaturase.

15 48. The oil of Claim 45 wherein in said method said regulatory elements function preferentially in plant seed.

*A* 49. The oil of ~~any one of Claims 45 to 48~~ <sup>46</sup> wherein the proportion of unsaturated fatty acids has been increased.

*A* 50. A host cell comprising a plant desaturase encoding sequence of ~~any one of Claims 1-17~~.

20 51. The cell of Claim 50 wherein said cell is a plant cell.

52. The cell of Claim 51 wherein said plant cell is *in vivo*.

25 53. The cell of Claim 52 wherein said plant cell is a rapeseed plant cell.

54. A transgenic host cell comprising an expressed plant desaturase.

55. The cell of Claim 54 wherein said host cell is a plant cell.

56. The cell of Claim 55 wherein said plant desaturase is a  $\Delta$ -9 desaturase.

57. A method of producing a plant desaturase in a host cell or progeny thereof comprising

5 growing a host cell or progeny thereof comprising a construct of ~~any one of Claims 1-10 and 12-17~~ under conditions which will permit the production of said plant desaturase.

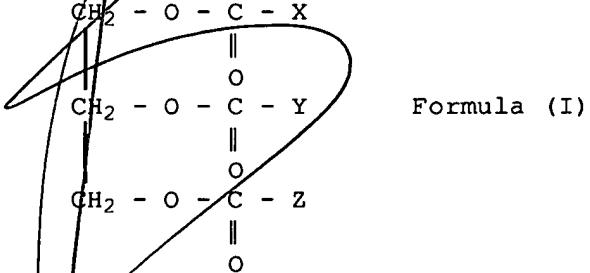
10 58. The method of Claim 57 wherein said host cell is a plant cell and said construct is integrated into the genome of said plant cell.

59. The method of Claim 58 wherein said plant cell is *in vivo*.

15 60. A host cell comprising a plant desaturase produced according to Claim 57.

61. The cell of Claim 60 wherein said host cell is a plant host cell and said construct is integrated into the genome of said plant cell.

20 62. A plant triglyceride oil comprising triglycerides of the formula:



30 wherein said plant is selected from the group consisting of rapeseed, sunflower, cotton, peanut, soybean and corn.

63. The oil of Claim 62 wherein Y is an unsaturated fatty acid acyl group.

64. The oil of Claim 63 wherein Y is oleate.

65. A stearate-rich rapeseed triglyceride oil.

5 66. The oil of claim 65 comprising at least 10% stearate.

67. The oil of Claim 65 comprising at least 45% stearate.

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